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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/582,432	06/26/2000	TAKUMI KATSURAO	2000_0719A	4316

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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 09/11/2002

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/582,432

Applicant(s)

KATSURAO ET AL.

Examiner

Susy N Tsang-Foster

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2 is/are allowed.
- 6) ☒ Claim(s) 1 and 3-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to the amendment filed on 4/30/2002. Claims 1-3, 7, and 9 have been amended. Claims 1-9 are pending. Claim 2 is allowed. Claims 1, and 3-9 are rejected for reasons below. This Office Action is made non-final as new art is applied that was not necessitated by applicants' amendment.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 1, 3-5, and 9 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over WO 98/38687 and as evidenced by Mitchell et al. (US 6,077,624).

The process limitation “obtained by introducing the monomers simultaneously all at once into a polymerization vessel and then polymerizing the monomers” is not given patentable weight in product claim 3.

The product-by-process limitation of claim 3 is not given patentable weight since the courts have held that patentability is based on a product itself, even if the prior art product is made by a different process (see In re Thorpe, 227 USPQ 964, (CAFC 1985), In re Brown, 173 USPQ 685 (CCPA 1972), and In re Marosi, 218 USPQ 289, 292-293 (CAFC 1983)).

WO 98/38687 discloses a solid-electrolyte lithium secondary battery comprising a positive electrode and a negative electrode and a solid electrolyte disposed between the positive and negative electrodes, the solid electrolyte comprising a vinylidene fluoride/hexafluoropropylene block copolymer as a matrix polymer (See page 9, and page 53 of WO 98/38687).

The block copolymer of vinylidene fluoride(VdF)/hexafluoropropylene block can comprise from about 2 wt% to about 8 wt % hexafluoropropylene (HFP) (see page 9 of WO 98/38687).

In a specific example, the block copolymer comprises 2.4 mol % HFP with the block copolymer having a weight average molecular weight of 676,000 (page 53 of WO 98/38687).

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In the amendment filed on 4/30/2002, applicants state on page 5 that the claimed inherent viscosity of greater than or equal to 1.7 dl/g roughly corresponds to $M_w \geq 500,000$. Therefore, the block copolymer comprising comprises 2.4 mol % HFP with the block copolymer having a weight average molecular weight of 676,000 inherently has an intrinsic viscosity greater than or equal to 1.7 dl/g.

Mitchell et al. disclose that a 97:3 mole ratio of VdF:HFP corresponds roughly to 93 weight percent VdF (col. 7, lines 55-67). Therefore, a 2.4mol% HFP in the block copolymer of WO 98/38687 corresponds to greater than 93 weight percent vinylidene fluoride which falls within the claimed range.

Since the weight ratio of vinylidene fluoride and hexafluoropropylene used in the copolymer and the inherent viscosity of the copolymer fall within the ranges claimed by applicants for a copolymer of vinylidene fluoride and a monomer polymerizable with vinylidene fluoride (that is, 80 to 97 wt% vinylidene fluoride and 3 to 20 weight% of at least one monomer copolymerizable with vinylidene fluoride), the properties cited in the instant claims of abnormal linkage content of at least 3% at vinylidene fluoride sites, and absorption from 50 to 85 wt% of the nonaqueous electrolytic solution are inherent in the copolymer of WO 98/38687.

When the Examiner has reason to believe that functional language (in this instance, the inherent properties of the intrinsic viscosity, of abnormal linkage content of at least 3% at vinylidene fluoride sites, and absorption from 50 to 85 wt% of the nonaqueous electrolytic solution of the copolymer) asserted to be critical for establishing novelty in claimed subject matter may, in fact be an inherent characteristic of the prior art as discussed above, the burden of

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proof is shifted to the applicant to prove that the subject matter shown in the prior art does not possess the characteristics relied upon. *In re Fitzgerald et al.* 205 USPQ 594.

5. Claims 1, and 3-9 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over WO 97/18596 (Equivalent document US 6,284,412 B1 relied upon for translation).

The process limitation “obtained by introducing the monomers simultaneously all at once into a polymerization vessel and then polymerizing the monomers” is not given patentable weight in product claim 3.

The product-by-process limitation of claim 3 is not given patentable weight since the courts have held that patentability is based on a product itself, even if the prior art product is made by a different process (see *In re Thorpe*, 227 USPQ 964, (CAFC 1985), *In re Brown*, 173 USPQ 685 (CCPA 1972), and *In re Marosi*, 218 USPQ 289, 292-293 (CAFC 1983)).

WO 97/18596 discloses a nonaqueous battery comprising a positive electrode comprising a positive electrode active material LiCoO_2 that is capable of being doped with and liberating lithium (col. 29, lines 63-67 of US 6,284,412 B1) and a negative electrode made of coke which is capable of being doped with and liberating lithium (col. 30, lines 7-14 of US 6,284,412 B1); and a polymer electrolyte between the positive electrode and the negative electrode (col. 25, lines 25-30 and col. 30, lines 15-29 of US 6,284,412 B1).

WO 97/18596 discloses that the polymer electrolyte can be a copolymer of vinylidene fluoride and hexafluoropropylene with hexafluoropropylene being 5 % wt in the copolymer and

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the copolymer can be crosslinked by an electron beam (col. 26, lines 55-65 of US 6,284,412 B1). The amount of nonaqueous electrolyte solution in the polymer electrolyte is 85 % by weight (col. 27, lines 40-45 of US 6,284,412 B1). The copolymer can also be crosslinked by radiation such as an electron beam or by a radical initiator (col. 15, lines 45-55 of US 6,284,412 B1). The copolymer of vinylidene fluoride preferably has a molecular weight of 1,000-10,000,000, preferably from 5,000 to 2,000,000, and more preferably from 10,000 to 1,000,000 (col. 14, lines 23-28 of US 6,284,412 B1).

In the amendment filed on 4/30/2002, applicants state on page 5 that the claimed inherent viscosity of greater than or equal to 1.7 dl/g roughly corresponds to $M_w \geq 500,000$. Furthermore, the Figure C of the amendment shows that the relationship between the intrinsic viscosity and the molecular weight (average molecular weight) of the copolymer of vinylidene fluoride and hexafluoropropylene can be expressed by the equation $y = 34.851 x^{-9.2093}$. When the values of 10,000 to 1,000,000 are substituted for y in this equation, the values of x are 0.0287 dl/g to 2.87 dl/g which overlaps with applicants' claimed range of 1.7 dl/g to 7 dl/g. The copolymer of WO 97/18596 having an average molecular weight of from 10,000 to 1,000,000 inherently has an intrinsic viscosity ranging from 0.0287 dl/g to 2.87 dl/g. The values of 1,000-10,000,000 average molecular weight would correspond to 0.0029 dl/g to 28.7 dl/g and the values of 5,000 to 2,000,000 average molecular weight would correspond to 0.014 dl/g to 5.74 dl/g according to applicants' equation in Figure C of the amendment.

Since the weight ratio of vinylidene fluoride and hexafluoropropylene used in the copolymer and the inherent viscosity of the copolymer fall within the ranges claimed by applicants for a copolymer of vinylidene fluoride and a monomer polymerizable with vinylidene

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fluoride (that is, 80 to 97 wt% vinylidene fluoride and 3 to 20 weight% of at least one monomer copolymerizable with vinylidene fluoride), the properties cited in the instant claims of abnormal linkage content of at least 3% at vinylidene fluoride sites and inherent viscosity having the claimed range are inherent in the copolymer of WO 98/38687.

When the Examiner has reason to believe that functional language (in this instance, the inherent properties of the intrinsic viscosity and of abnormal linkage content of at least 3% at vinylidene fluoride sites) asserted to be critical for establishing novelty in claimed subject matter may, in fact be an inherent characteristic of the prior art as discussed above, the burden of proof is shifted to the applicant to prove that the subject matter shown in the prior art does not possess the characteristics relied upon. *In re Fitzgerald et al.* 205 USPQ 594.

6. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 98/38687 in view of Gozdz et al. (US 5,429,891).

The product by process limitations of claims 7 and 8 are not given patentable weight.

The product-by-process limitations of claims 7 and 8 are not given patentable weight since the courts have held that patentability is based on a product itself, even if the prior art product is made by a different process (see In re Thorpe, 227 USPQ 964, (CAFC 1985), In re Brown, 173 USPQ 685 (CCPA 1972), and In re Marosi, 218 USPQ 289, 292-293 (CAFC 1983)).

WO 98/38687 discloses all the limitations of claims 6-8 except that the copolymer is crosslinked.

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Gozdz et al. disclose that the polymer for the polymer electrolyte in a battery can be a copolymer of vinylidene fluoride and hexafluoropropylene with about 8 to about 25% hexafluoropropylene by weight and with about 75 to about 92 wt % being vinylidene fluoride (col. 6, lines 31-40), that the copolymer of vinylidene fluoride and hexafluoropropylene can be crosslinked in the presence of an acrylate ester, a di- or triallyl ester, and a di- or triglycidyl ether (col. 3, lines 40-45) and electron beam radiation (col. 5, lines 20-25) and that crosslinking the copolymer increase its mechanical properties (col. 2, lines 62-68).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to crosslink the copolymer of vinylidene fluoride and hexafluoropropylene because crosslinking the copolymer increases the mechanical properties of the copolymer.

Response to Arguments

7. Applicant's arguments with respect to claims 1, and 3-9 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

8. Claim 2 is allowed.

9. The following is a statement of reasons for the indication of allowable subject matter:

The present invention claims a polymer electrolyte comprising a vinylidene fluoride copolymer and a nonaqueous electrolytic solution and the vinylidene fluoride copolymer comprises 80 to 97 wt% of vinylidene fluoride monomer units and 3 to 20 wt % of a mixture of

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hexafluoropropylene monomer and trifluorochloroethylene monomer and the copolymer has an inherent viscosity of 1.5 to 10 dl/g (applies to claim 2).

The closest prior art of record, Gozdz et al. (US Pat. No. 5,571,634) disclose a nonaqueous battery comprising a polymer electrolyte comprising a copolymer of vinylidene fluoride and chlorotrifluoroethylene where the chlorotrifluoroethylene is present about 8 to 20% by weight (col. 6, lines 29-35) but does not disclose, teach, or suggest a polymer electrolyte comprising a copolymer of vinylidene fluoride, chlorotrifluoroethylene and hexafluoropropylene where the total amount of chlorotrifluoroethylene and hexafluoropropylene in the copolymer is 3 to 20% by weight of the copolymer and the copolymer has copolymer has an inherent viscosity of 1.5 to 10 dl/g.

The closest prior art of record, EP 793286 discloses a terpolymer of vinylidene fluoride, hexafluoropropylene, and trichlorofluoroethylene (see page 2) but does not disclose, teach or suggest that the terpolymer has an inherent viscosity of 1.5 to 10 dl/g.

Conclusion

10. Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (703) 305-0588. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (703) 308-2383. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900.

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The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9310 for regular communications and (703) 872-9311 for After-Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

st/7 September 2002

Amy Isang Foster